Diesel Particulate Filter Regeneration with On-Board Produced Hydrogen-Rich Gas

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The proposed research is part of a research study on the development of a diesel engine emissions reduction system with enhanced performance by utilisation of hydrogen produced on-board by exhaust gas fuel reforming. The research is motivated by the requirement of diesel engines to meet future emission regulations and by the potential of on-board exhaust gas fuel reforming to provide a way of improving diesel combustion and emissions as well as increasing the efficiency of diesel engine aftertreatment devices. The system targets are to achieve HC, CO and particulate matter (PM) emissions reduction of >90% using a diesel oxidation catalyst (DOC) and a diesel particulate filter (DPF), respectively, and NOx reduction of >70% using lean NOx catalyst technology (HC-SCR or NH3-SCR or NOx trap). The system will have to be cost effective (i.e. use of base metal catalyst or reduced precious metal catalyst content) and should operate without the need of specific engine map development. Specifically, the purpose of the present proposal is to extent the scientific knowledge on PM aftertreatment assisted by reformate addition that will allow successful integration of the DPF and reforming technologies. The study unfolds into two main parts: i) investigation of the use of reformate to promote the soot oxidation and hence improve the DPF regeneration at low exhaust gas temperatures (Brunel University) and ii) investigation of the improvement of DPF regeneration by soot oxidation with NO2 achieved through promotion of the low temperature NO to NO2 conversion rates in a DOC situated upstream of the DPF by addition of small quantities of reformate (University of Birmingham). By extending the understanding of the fundamental processes occurring during NO oxidation and filter regeneration, new catalysts and catalytic systems will be designed and guidelines for the further stages of the research programme towards a full working diesel engine - fuel reformer - aftertreatment system will be developed. T

Partners for this project are:

- University of Birmingham
- Johnson Matthey